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ABSTRACT

This paper summarizes two related sets of data. First, the findings of an inquiry titled, "The Appropriateness of Forced Choice True/False Response Formats for Selected Learning Style Inventories" is reported. This inquiry compared data from two forms of the Dunn/Price Learning Style Inventory. The first form was the real Dunn/Price inventory; the second added an uncertain column. Two significant findings emerged. First, 28 percent of the upper grade elementary students (N=112) marked 20 percent or more of the items uncertain when given the opportunity. Second, these items clustered in potentially significant ways. The second part of the paper discusses the general implications which learning style inventories have for the field of curriculum and instruction. A list of research projects worthy of development is included. (Author)

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LEARNING STYLE INVENTORIES:

IMPLICATIONS FOR CURRICULUM AND INSTRUCTION

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TM 830 261

LEARNING STYLE INVENTORIES:

IMPLICATIONS FOR CURRICULUM AND INSTRUCTION

INTRODUCTION

In preparing ourselves to enumerate and discuss the implications which learning style inventories have for the field and practice of curriculum and instruction we have done two things. First, we conducted an indepth analysis of one specific learning style inventory, the Dunn/Price Learning Style Inventory. This analysis included a review of the literature pertinent to this instrument as well as an inquiry concerning the true/false format of, and clarity of selected items from, this instrument. In addition, the authors also studies several other learning style inventories, namely the Renzulli/Smith Learning Styles Inventory (1978, 1983), The Fuhrmann/Jacobs Learning Interaction Inventory (1980, 1981), the Grasha/Reichmann Student Learning Styles Questionnaire (1974, 1975, 1982), and the Babich/Burdine Murdock Teacher Center Learning Styles Inventory (1976). Beyond this, we also examined other approaches to learning style diagnosis and prescription, namely Manual Ramirez III's approach which makes extensive use of teacher observations which are directed by his Early Learning Behaviors Checklists (1983), and David E. Hunt's approach which, among other things, sharpens a teacher's perception of his/her own learning style prior to asking that teacher to observe and speculate about his/her students' learning needs and styles (1982, 1983).

Having worked, in our preparation for this presentation, on a highly focused inquiry as well as a more general study of learning

style inventories, we shall proceed in this report as we did in our overall inquiry, from the specific to the general. Thus, we shall first present a report on an inquiry entitled, "The Appropriateness of Forced Choice True/False Response Formats for Selected Learning Style Inventories."

THE SPECIFIC

The instrument we focused our attention on was the Dunn/Price Learning Style Inventory (hereafter LSI), a 104 item inventory which, until quite recently, required, or strongly encouraged, students in grades three through twelve to answer true or false to the inventory's 104 items. While this was true during the time of our inquiry, Dr. Price, in a recent paper (1983), reveals that the 1983 revised version of the Dunn/Price LSI will have two response formats--one for grades 3-5; the other for grades 6-12. The latter will utilize a five point Likert Scale, while the former (grades 3-5) will continue to utilize a true/false forced choice response format. From our point of view, this makes our inquiry all the more interesting because the inquiry we conducted with fourth through sixth graders in Bowling Green, Ohio, and Paso Robles, California, was designed to evaluate the accuracy and appropriateness of the true/false format for elementary school students who were completing the Dunn/Price LSI. Thus, we worked with the very group who will continue to receive the forced choice true/false response format.

Prior to going into the specifics of our inquiry, we will provide some background and descriptive information regarding the 1978 version of the Dunn/Price LSI. The 1978 version of the Dunn/Price LSI stemmed

from a learning style questionnaire developed by Rita Dunn in the early 1970's. In Gary Price's own words:

> This instrument (The Learning Style Questionnaire) was administered to several hundred individuals and reliability analyses were conducted to determine what items provided the highest internal consistency for each of the areas. Based on this analysis, the items that were found to be most consistent and provide the highest reliability were used to develop the 1975 version of the Learning Style Inventory. This version was then administered to twelve hundred individuals from five states. Based on this administration, the items were factor analyzed to provide a statistical foundation and a mathematical model for identifying independent and discrete areas. (1983)

Further work on the items in the tactile and kinesthetic areas, as well as other reliability analyses resulted in the 104 item instrument we utilized in this inquiry.

As the chart in Table One indicates, the factor analysis procedures employed by Dunn, Dunn, and Price resulted in an instrument with twenty-three areas which represented four major categories, namely the immediate environment (sound, temperature, light, and design), emotionality (motivation, responsibility, persistence, and the need for either structure or flexibility), sociological needs (self-oriented, peer-oriented, adult-oriented, and/or combined ways), and physical needs (perceptual preferences, time of the day, food intake, and mobility). In addition, the last column in the chart reveals that the factor analysis procedures carried out by Gary Price resulted in areas with varying numbers of items, i.e., auditory preference has two items, motivated/unmotivated has three, and kinesthetic preferences has eleven. As indicated in the footnote to Table One, these are not the groupings used in statistical analyses of student responses to the LSI. However, the difference in item groupings does not significantly alter the findings of this study.

TABLE ONE

THE DUNN/PRICE LEARNING STYLE INVENTORY

AREAS AND ITEMS*

LSI Category Number	Learning Style Area	The Items	Total Number of Items**
1	Sound	1, 32, 44, 88, 101	5
2	Light	3, 16, 34, 65	4
3	Warmth	5, 10, 36, 39	4
4	Formal Design	6, 7, 19	3
5	Motivated/Unmotivated	9, 45, 63	3
6	Adult Motivated	15, 41, 97	3
7	Teacher Motivated	11, 30, 40, 54, 59, 91	6
8	Persistent	13, 28, 38, 47, 59, 71, 76, 81, 82	9
9	Responsible	14, 42, 49, 82	4
10	Structure	4, 23, 33, 52, 74	5
11	Prefers Learning Alone		
12	Peer Oriented Learner	8, 17, 56, 67, 84, 94, 102	7
13	Learning with Adults	2, 37, 53, 57, 77, 78, 87 98	8
14	Prefers Learning Through Several Ways	8, 20, 94	3
15	Auditory Preferences	27, 92	2
16	Visual Preferences	21, 33, 40, 43, 61	5
17	Tactile Preferences	35, 60, 64, 72, 89, 99	6
18	Kinesthetic Preferences	31, 40, 51, 54, 55, 68, 72, 83, 85, 99, 104	11
19	Requires Intake	18, 22, 24, 66, 93	5
20	Functions Best in Morning/Evening	12, 26, 48, 62, 69, 73, 79, 86	8
21	Functions Best in Late Morning	75, 79, 90	3
22	Functions Best in Afternoon	29, 50, 62, 96, 100, 103	6
23	Needs Mobility	25, 58, 70, 95	4

*Based on data provided on page 53 of the Learning Style Inventory Manual (1981 edition).

**Item groupings based on factor analysis not on content analysis. Statistical analysis of LSI responses done by Price Systems Inc. is based on groupings created by content analysis. No area has less than four items in groupings based on content analysis. However, content analysis item groupings are unavailable for research purposes.

With regard to scoring, Dunn, Dunn, and Price utilize a statistical format to identify whether or not a student's score is high, low, or medium in a given area. It is with this statistical format that Dunn/Price try to avoid the dissemination of individual learning style profiles which might, because of the forced choice true/false response format of the LSI, reflect high degrees of uncertainty. To clarify the scoring procedure utilized by Dunn/Price we will score and discuss the items from the "Responsibility" area of the Dunn/Price LSI.

THE LSI RESPONSIBILITY ITEMS		True	False
#14	I have to be reminded often to do something.	[ ]	[ ]
#42	I remember to do what I am told.	[ ]	[ ]
#49	I have to be reminded often to do something.	[ ]	[ ]
#82	I keep forgetting to do the things I've been told to do.	[ ]	[ ]

If a student answers these four items F, T, F, F, she is presumably responsible. Each of the above responses, because they indicate responsibility, receive a score of one. If any of the four items had been marked the opposite way, indicating a lack of responsibility, they would have received a score of zero. Thus, in the "responsibility" area of the LSI a student's raw score can range from zero to four.

Now, after a student completes the LSI, her scores in each area are compared against the "normative distribution" for each area. The normative distributions were created by categorizing and summarizing the data generated by a randomly selected sample of 1,596 third through twelfth graders. Each of these 1,596 students received a raw

score ranging from zero to four in the "responsibility" area of the LSI. These 1,596 raw scores were summed and divided by 1,596 to get the "normative" mean for the "responsibility" area. After this the "normative mean" and 1,596 raw scores were used to generate a "normative" standard deviation for the "responsibility" area of the LSI. In this manner the raw scores of the randomly selected 1,596 students provided Dunn/Price a "normative" mean and standard deviation for each of the twenty-three LSI areas. These "normative" means and standard deviations are utilized in the Dunn/Price scoring procedure in the following way. Dunn, Dunn, and Price decided that the following standards would hold true when they evaluated each student's scores in the twenty-three areas of the LSI, and based on these standards a twenty-three area profile would be generated for each student:

a) students whose raw score was one standard deviation or more above the normative mean in a particular area would be described as strongly preferring the area in question when they study (i.e. sound, light, warmth, etc.);

b) students receiving a score which was one standard deviation or more below the normative mean would be described in the opposite way; and

c) students scoring between plus and minus one standard deviation would receive a "neutral" assessment. Their preference or lack of preference for this area would not be described in specific terms, and teachers would not receive a precise instructional prescription in this area (Dunn, Dunn, and Price, 1981).

Now, in a normal distribution only sixteen percent of the scores will be one standard deviation or more above the mean, and only sixteen percent will be one standard deviation below the mean. So, by choosing one standard deviation above or below the normative mean as their "defining parameter" Dunn, Dunn, and Price have apparently been statistically cautious in deciding when they will say that a given student does or does not prefer a given area. Given that their forced choice true/false response format might lead a student to respond true or false when she was really uncertain, the defining parameter of one standard above or below the mean was their approach to diminishing the influence which student uncertainty might have on their numerical conclusions about a student's learning style. Dunn/Price assumed that students who were highly uncertain about the items in a particular area would generate a set of true and false responses which would add up to a "neutral score," that is, a score which would fall in the "no strong preference" area between plus and minus one standard deviation.

While the Dunn/Price statistical approach to minimizing the distortional influence of student uncertainty seemed mathematically reasonable, the apparent ambiguity of selected LSI items, and the small number of items in several areas (one two-item and five three-item areas based on factor analysis), and the strong claims made about the validity of the LSI set the stage for the inquiries reported below.

To begin with, we wanted to find out if substantive amounts of uncertainty would accrue if fifth and eleventh grade students were given an adumbrated and modified form of the LSI. Thus, a thirty-five item version of the LSI, with an uncertain column added to the

response format, was administered to 119 fifth graders and 107 eleventh graders in Lucia Mar Unified School District, California. We found that 31 percent of the fifth graders and 21 percent of the eleventh graders answered 20 percent or more of the items uncertain. This pilot study indicated potential problems with the interpretation of student responses to the LSI. Thus, a second, more tightly designed, phase of the inquiry seemed to be warranted.

In the next phase of the inquiry we utilized two forms ("A" and "B") of the full 104 item Dunn/Price LSI. Form "A" was the real Dunn/Price LSI, and Form "B" was the real one plus our uncertain column. From the data collected in this phase, which included interview as well as LSI data, we wanted to find out:

a) how well students comprehended the items they were responding to in three specific areas of the LSI (the teacher motivated, structure, and kinesthetic preferences areas);

b) if, once again, we would find that 20 percent or more of the students would have 20 percent or more of their items marked uncertain (if such students emerged, we decided to call them "Green" students);

c) if the uncertainty, which might be manifest, would cluster so that some of the 23 LSI areas, on various inventories, would have 50 percent or more of their items marked uncertain (If such patterns emerged in selected areas, we decided to call these areas "high uncertainty," or H.U., areas); and

d) if the data collected in Bowling Green City Schools and Paso Robles Schools would yield a substantial number of "high uncertainty" areas.

Finally, if a substantial number of "high uncertainty" areas did emerge from the Form "B" data, we wanted to test the implicit Dunn/Price assumption that students' uncertainty in selected areas would result in "neutral" scores on the Form "A" data--that is, scores which would fall in between plus and minus one standard deviation.* We decided that "high uncertainty areas which did not receive scores between plus and minus one standard deviation would be labelled "potentially misleading areas" or PMA's.

METHOD

The respondents in this inquiry, in Bowling Green, Ohio, and Paso Robles, California were selected on the basis of availability. In Bowling Green City Schools, students from two fifth grade classes (one from each of two schools) whose parents had signed permission slips, were randomly divided into two groups. Group one would take the Form "A" LSI in late May 1982 and the Form "B" LSI in February 1983; group two would take the forms in the opposite order. In Paso Robles the same procedure was followed, except that in Paso Robles respondents

*It is worth noting here that our numerical standard for "high uncertainty," namely 50 percent or more of the items in any area, was selected by the authors and is not necessarily shared by Dunn, Dunn, and Price. Further, our remarks about how uncertainty would be dealt with in the Dunn/Price LSI is based on oral and written communication between the authors, Gary Price, and Rita Dunn, as opposed to material they have published.

came from six classes in three different elementary schools and included fourth and fifth graders.

In addition to the Form "A" and "B" LSI data, twenty-five randomly selected students (13 from Bowling Green and 12 from Paso Robles) were interviewed, after completing either the "A" or "B" form, according to questions laid out in an interview schedule (see Appendix C). The students were questioned on nine of the LSI items. Data from students with language deficits in English or from students labelled "learning disabled" were excluded from the data analysis, and such students were not part of the interview sample. This exclusion was chosen because these students might experience more uncertainty than other students thus creating a false profile of the degree of uncertainty students would have with the LSI.

The instructions to students on the Form "A" and Form "B" (see Appendix A) were similar and carefully worded so as to avoid encouraging students to mark the uncertain column. Graduate students, who administered the inventories and conducted interviews, were given highly structured scripts to standardize their performances (see Appendix B).

The number of academic months between the two administrations was six, which is two months less than the eight month period for which the Dunn/Price LSI is reported to have good reliability (Dunn, Dunn, and Price, 1981). In addition, arranging the data collection so that Form "A"/Form "B" data collected for each individual spanned two learning environments diminished the influence which any one teacher might have over a student's responses. Finally, allowing one-half the group to take Form "A" first and vice-versa, and leaving six months in

between administrations reduced the effect which a "mind set" might have had on respondents. In retrospect, we feel that the administrations should have been closer together in time, possibly three or four months apart instead of six.

Ultimately, the two administrations, one in May 1982 and the other in February 1983, produced a total of 118 students--45 from Bowling Green and 73 from Paso Robles, for whom we had both Form "A" and Form "B" data to summarize and compare.

LIMITATIONS

Two limitations to this study should be noted. First, the six month period between administrations of the two forms of the LSI covered two academic years. Thus, the students' responses could be affected by the influence of being in two different classrooms. However, it would have to be assumed that while students' responses might change (a phenomenon noted by Dunn, Dunn and Price in the Learning Style Manual) the degree of uncertainty should also diminish through maturation and increased experience in different classrooms.

Second, the discussion of PMA's (potentially misleading areas) is based on the factor analysis of the LSI rather than the content analysis. The factor analysis has six areas with less than four items. However, the content analysis has no areas with less than four items. Since PMA's were found in categories that had four or more items, it could be argued that a proportional number of PMA's would emerge if the content analysis item groupings were utilized. Due to copyright restrictions, the content analysis cannot be used for research purposes.

THE FORM "A"/FORM "B" LSI RESULTS

As the data in table two makes clear the results in Bowling Green and Paso Robles were quite similar. In each setting there was a sizable number of green students (27 percent of the total "N" in Bowling Green and 29 percent of the total "N" in Paso Robles). In addition, for this group of green respondents, who were 28 percent of the combined "N" of 118, almost one-third of their total LSI areas were "high uncertainty" areas. Furthermore, when compared with their corresponding areas in the Form "A" data, in both Bowling Green and Paso Robles, 46 percent of the "high uncertainty" areas became "possibly misleading areas" (PMA's). This worked out to an average of 3.25 PMA's per Bowling Green green student (N = 12) and three PMA's per Paso Robles green student (N = 21). The range of PMA's in Bowling Green was zero to six; in Paso Robles it was one to seven.

THE INTERVIEW RESULTS

The transcripts of our twenty-five tape recorded interviews confirmed our belief that elementary school students would divergently interpret selected terms and phrases contained in several LSI items. For example, there was uniform confusion over the term outline (from LSI item #23--I like others to outline how I should do my school work--from the Structure Area). Some students interpreted it as giving directions, some as getting help from a teacher or classmate, and some as actual outlining, i.e. use of Roman Numerals I, etc. In addition, there was uniform confusion over the term feel inside (from LSI item #31--I like to feel inside what I learn). Some students had absolutely no verbal interpretation of what it meant; some interpreted it as doing things; and others interpreted it as an affective response

TABLE TWO

A JUXTAPOSITION OF PASO ROBLES AND BOWLING GREEN DATA

	The Items	Paso Robles	Bowling Green
a.	N	73	45
b.	Number of Green Students	21	12
c.	Percent of Green Students	29	27
d.	Range of Uncertainty in Green Students	23-52 Uncertains	26-47 Uncertains
e.	Total Number of H.U.* Areas in Green Group	137	85
f.	Ave. Number H.U. Areas/Green Student	6.5	7
g.	Total Number of PMA's** in Green Group	63	39
h.	Average Number of PMA's per Green Student	3	3.25
i.	Range of PMA's in Green Group	1-7	0-6

*H.U. = "High Uncertainty"

**PMA = "Potentially Misleading Area"

to learning. Their interpretations did not mesh neatly with the "Kinesthetic Preferences" category in which this item was included. Finally, there was a higher than average level of confusion over the term real experience (from LSI item #8--I like to learn through real experiences--in the Kinesthetic preferences area). Some students interpreted the term to mean field trips, others as "learning by doing," and some as experiences which involved movement. According to Gary Price, these interpretations are consistent with the way the LSI defines outline, feel inside, and real experience, however.

INTERPRETATION AND IMPLICATIONS

We do not believe our findings would come as a surprise to Rita Dunn, one of the LSI's creators. We have in mind a statement she made in a recently published essay (1983) where she wrote:

> Many people wonder whether students are really capable of analyzing how they learn best (their learning "style"). Obviously, some cannot. Others can sometimes. But in testing more than 175,000 youngsters in grades 3-12, we find that most children not only can tell you how they learn, they want to and are delighted that you asked. What causes problems is that no one is affected by all the elements of learning style. Obviously students can't tell you about any personal reactions to elements that aren't important to them. But where an element is either a very strong preference or a very negative preference, most children can describe their feelings about it and reactions to it very well.

Our data supports Professor Dunn's declaration, but also goes a bit beyond it. We found, in our sample of 118 fourth-sixth graders that approximately 70 percent of our group could and would respond true or false to the vast majority of LSI items, and in so doing would cumulatively "describe" significant aspects of their learning style. Contrastingly, we uncovered another group of approximately 30 percent, or perhaps six to eight students in an average upper grade elementary

classroom, whom, we predict, will fall into the green group--those students who will mark 20 to 50 percent of the LSI items uncertain if given the opportunity. Some of these students, no doubt, are the ones Rita Dunn refers to when she declares that some students are not capable of analyzing how they learn best. These students bring substantial amounts of uncertainty to the act of describing their learning preferences, and our data suggests that they would be best served by an instrument which allowed their uncertainty to be expressed in an explicit way. In addition, all students, but these "high uncertainty" students in particular, would benefit from a clarification of selected items either by revision of selected items or by pre-administration procedures which clarified the meaning of certain terms and phrases.

In addition, beyond this, and quite tentatively, our data implies more. We see that, on the average, our green students with their scores will, in three areas of their LSI's, say one thing on the Form "A" and another on the Form "B". On one Form "B", for example, a student marked forty-three items uncertain, and when distributed across the twenty-three LSI areas these forty-three uncertains created ten "high uncertainty" areas, three of which had 75 percent or more uncertainty. What happened when these ten areas were juxtaposed against their counterparts in the student's Form "A" profile is quite interesting and not atypical. We found in five of the ten "high uncertainty" areas (and the five included the three 75 percent plus areas) that the green student responded to the Form "A" LSI in a manner which produced high or low preference scores in the very same five areas in which she had earlier expressed high uncertainty (see

Appendix D). In which situation, the Form "A" or the Form "B", is this representative green student more truthfully, or accurately, analyzing her learning style? This strikes us as a very complex and interesting question, but one which does not lend itself to an easy answer, at least not with the data we have. This complexity aside, the situation which gave rise to the question, a situation where significant numbers of elementary school students (one in four) in two different geograpnical settings, were giving one message on the Form "A" and another message on the Form "B", does underline the value of continuing with this line of Form "A"/Form "B" research. Given several replications, it would be interesting, for example, to see if:

1) green groups, in a magnitude similar to the Bowling Green/Paso Robles data (28 percent of total N) continued to emerge in other elementary school populations;
2) another group consisting of students with 15 to 20 "uncertains" out of 104 items, emerges in any significant magnitude. In Bowling Green there were eight such students (17 percent of 45), and in Paso Robles there were thirteen such students (18 percent of 73);
3) the average number of "potentially misleading areas" per green student is similar to the average of 3.25 and 3.0 found in the Bowling Green and Paso Robles groups; and
4) a categorization of the areas which are ultimately labelled as "potentially misleading" indicates that areas with a smaller number of items on the LSI (the two and three-item areas) are more frequently identified as "potentially misleading." For example, in both Bowling Green (N = 12)

and Paso Robles (N = 21) one-third of the students who had PMA's had "auditory preferences", a two-item area, turn up as one of their PMA's.

In addition, if further research demonstrated that the PMA's continued to turn up in a magnitude similar to our findings, then it would be appropriate to replicate this inquiry in a manner which would allow the "potentially misleading areas" to become the focus of both interview and observational research aimed at clarifying why these discontinuities exist between the Form "A" and Form "B" data.

Finally, given more replications supporting our findings, and clarification regarding the above-mentioned discontinuities, we think it would be appropriate for Dunn, Dunn, and Price to begin experimenting with a Likert Scale response format for the elementary version of the Dunn/Price LSI.

THE GENERAL

Although the focus of this presentation is on the implications which learning style inventories create for the field and practice of curriculum and instruction, we consider it noteworthy that our review of the literature revealed that practitioners and theorists were defining and diagnosing learning style in a variety of ways (Dunn/Debello, 1981; Fuhrmann/Jacobs, 1981, and see Appendix E).

In terms of approaches we saw that some practitioners and theorists were relying on systematic experience-based observation to classify learners (David Hunt, 1983), while others were using well defined checklists to guide the classroom observation of teachers (M. Ramirez III, 1983). By and large, these two approaches were being used, or recommended for use, in the elementary grades where some

practitioners and theorists believe that teacher observation and intuition, guided or unguided, will be more insightful than student self-report.

On the other hand we noted that self-report approaches to learning style diagnosis, which are based primarily on students' own insight into their learning preferences, strengths, and patterns, were also in use. In the self-report category students' insights were being elicited via sentence completions, extensive interviews based on interview schedules, and a variety of learning style inventories. The latter differed along content and structural lines, were heavily influenced by their author's definition of learning style, and were often targeted at a specific population--the most common divisions being grades three through twelve, i.e., the Dunn/Price Learning Style Inventory and the Renzulli/Smith Learning Styles Inventory, and high school college, i.e., the Grasha/Reichmann Student Learning Style Scales and the Fuhrmann/Jacobs Learning Interaction Inventory. In addition, it is worth noting that a learning style inventory based on the Dunn/Price Learning Style Inventory has been developed for K-3 students (Perrin, 1981) and that another content-based inventory, The Reading Style Inventory (Carbo, 1980, 1981), also based on the Dunn/Price Learning Style Inventory, has been developed. These instruments, and others, are described in the Instrument Classification System, a publication of the Learning Styles Network (1983).

The diversity of definitions and approaches to learning style diagnosis and prescription (or discovery and nurturance if you prefer these terms) is an indication, first that the learning style "idea" has stimulated the imagination of educators, and second that a

refinement process is under way. Based on these developments, we believe that learning style discovery and nurturance will move from a skeptical, experimental phase (the 1970's), where the link to instructional decision-making was tenuous and fairly uncommon, to a middle phase (the 1980's) wherein teachers will more frequently use data about learning style characteristics to make basic instructional and curriculum decisions.

The history of Manual Ramirez the III's Early Learning Behaviors Checklist (numbers 1 and 2) typifies this movement from conceptualization and research and development in the seventies to curriculum development, classroom implementation, and continued research and refinement in the eighties. Of all the diagnostic instruments and approaches examined, it is Ramirez's Early Learning Behaviors Checklist and concept of learning style, which is now solidly embodied in an attractive, primary grade, bilingual/bicultural, state-adopted, interdisciplinary curriculum (Cox, Macaulay, Ramirez, 1982), which appears to have most successfully made the leap from research and development and scattered usage to a level of acceptance and curriculum development which should translate into school and district-wide utilization. The Dunn/Price Learning Style Inventory, which has been used to diagnose approximately 175,000 students in the past seven years, is another clear indication that practitioners are ready to utilize learning style data to help create more favorable learning environments for individual students, and the 1983 revision which will utilize a Likert Scale for students in grades 6 through 12 should increase the validity and popularity of this instrument. Another sign which suggests that we may see more widespread use of learning style

data to inform decision making is the appearance of uncopyrighted, teacher-created, self-scoring, learning style instruments (Babich, Burdine, et al., 1976). When considered alongside the rapid increase in microcomputer technology and expertise in K-12 school organizations, the appearance of these free instruments will make learning style discovery and nurturance (or diagnosis and prescription) more feasible for teachers and school districts experiencing difficult economic times. The expanded research base and rationale which now exists and supports the move towards increased utilization of learning style data is another factor which suggests that we will see more learning style informed education at all levels of education, K through college, in the 1980's (Price, 1983; Renzulli/Smith, 1983; Ramirez, 1983; Keefe, 1982; Dunn, 1982).

Given the above background, we can now speak directly to the question: "What are the curricular and instructional implications of the learning style inventories which are now available?". We believe that one implication is clear from the information we encountered in the literature and enumerated above. Namely, that in the eighties learning style discovery and nurturance will be more economically and politically feasible. In addition, the continued refinement of old, and continued development of new inventories, many of them targeted to specific populations, should translate into more research opportunities where the effects of learning style discovery, nurturance, and expansion can be analyzed. Finally, our own work with the Dunn/Price LSI, along with our examination of the learning style literature suggests that practitioners and researchers should move forward with both vigor and careful deliberation. The realization

that some learning preferences (or styles) change over a period of six to eight months, plus the realization that limited exposure to selected teaching strategies and learning environments will limit students' conception and perception of their learning preferences, and our interview data which suggests that students' preferences are influenced by the relationship between students and the specific teachers they are experiencing, and the realization that there are at least a dozen different conceptions/definitions of "learning style" in a literature which is approximately a decade old, in our minds, add up to the conclusion that efforts to create constructive learning style/teaching style dialogues between teachers and students, and teachers and administrators, should be carefully and cautiously designed and where possible should be organized to enhance the "learning style" knowledge base. In other words, and in general, we believe that learning style inventories, and checklists, etc. will, and should, be used. Simultaneously, we strongly believe that practitioners should study learning style informed education at the same time that they create it, for we believe, first, that there are significant questions worthy of clarification and, second, that a number of these questions lend themselves to practitioner-initiated research. (See Appendix F for a brief list of research questions and projects which district level learning style committees might tackle.)

REFERENCES AND RELATED SOURCES

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A P P E N D I X A

INSTRUCTIONS FOR THE FORM "A" AND FORM "B" LEARNING STYLE INVENTORIES

School_____ Student Name_____

Grade_____ Date_____

THE LEARNING STYLE INVENTORY

(FORM A)

GENERAL REMARKS

The inventory you will complete today will give us some ideas about the way you learn. It is important that you realize that this inventory is not a test. It is a tool designed to help students learn more effectively. Remember, there are no "right" or "wrong" answers on this inventory, and no grades. Let us, now, look more closely at our inventories and specific instructions.

INSTRUCTIONS

A. Read each sentence carefully and then ask yourself: "Is this true about me, or not true?".

B. If it is true about you, put a check in the box under TRUE on the questionnaire.

C. If it is not true about you, put a check in the box under FALSE.

D. If you don't know the meaning of a word, raise your hand. Your teacher will help you.

E. Please answer each of the 104 sentences.

F. If you finish early remain at your seat and read, write or place your head down to rest.

School_____ Student Name_____

Grade_____ Date_____

THE LEARNING STYLE INVENTORY

(FORM B)

GENERAL REMARKS

The inventory you will complete today will give us some ideas about the way you learn. It is important that you realize that this inventory is not a test. It is a tool designed to help students learn more effectively. Remember, there are no "right" or "wrong" answers on this inventory, and no grades. Let us, now, look more closely at our inventories and specific instructions.

INSTRUCTIONS

A. Read each sentence carefully and then ask yourself: "Is this true about me, or not true?".

B. If it is true about you, put a check in the box under TRUE on the questionnaire.

C. If it is not true about you, put a check in the box under FALSE.

D. If you're not sure whether the sentence is true or false about you, then put a check in the box under UNCERTAIN.

E. If you don't know the meaning of a word, raise your hand. Your teacher will help you.

F. Please answer each of the 104 sentences.

G. If you finish early, remain at your seat and read, write, or place your head down to rest.

A P P E N D I X B

THE SCRIPTS GIVEN TO

GRADUATE STUDENT INTERVIEWERS AND TEST ADMINISTRATORS

CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo

Education Department

The Bowling Green/Paso Robles Learning Style Inquiry

The Pre- and Post- "Interview" Script

RECOMMENDED SEQUENCE:

1. Prior to picking student up from room, say the following into tape recorder:

   "The first interviewee at _____ Elementary is _____, 4th grade. The date is May 24, 1982."

2. After picking child up at his or her room, and while walking back to the interview room, and introducing yourself to the child (again), try to establish some rapport by asking the child light pertinent questions such as:

   a. What did you think about the inventory you filled out this morning?*

   b. Were you surprised by some of the Questions? Interesting? Which ones?

   c. Have you ever been interviewed before? Well, I know you're going to enjoy this interview.

3. In the room, after you've both sat down, say:

   a. "Now, (name), before I begin the interview there are a few things I want you to know. Once again, this is not a test. It's just a talk between you and me, which will help educators like Professor Davidman and your principal understand more about learning style inventories."

   b. "What you say today will be tape recorded and then studied, along with many other tape recordings. Right at this moment there are students in every elementary school in Paso Robles, and other parts of the USA, being asked these same questions."

   c. "Now, these are the questions (show them to child) I will read to you one-by-one, leaving you plenty of time to think and answer. Remember, there's no need to rush your answer."

   d. "Now, do you have any questions you'd like to ask me?" "Okay, then I think we're ready to begin."

4. At the completion of interview, say:

   "(name), we really appreciate your help this morning. Would you return to your class now and tell (name) that I'll be along in a moment to pick her (or him) up? Thank you again."

5. Read next child's name, etc. into tape recorder.

---

*The idea here is to paraphrase these questions, and to be natural. We want to relax the child.

CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo

Education Department

The Bowling Green/Paso Robles Learning Style Inquiry

Script for Administration of *Learning Style Inventory*
(Form "A" and Form "B")

SEQUENCE OF ORAL REMARKS

After the teacher turns the class over to you, say:

1. "Hello. My name is _____ (write your name on the board), and I will be helping you this morning as you answer the true/false questions on the *Learning Style Inventory*. Before we go further, I want to make clear that the inventory you will complete is not a test. There are no "right" or "wrong" answers, and no grades, on this inventory. The inventory (hold it up) is simply a tool which will help teachers learn more about you so they can teach you more effectively."

2. "Now, I need to explain that, today, the students in this class will be working on two different inventories. This will help your teacher and me as we study the *Learning Style Inventory*. We will have two groups today, one group working on Form "A" (hold it up) and the other on Form "B" (hold it up). Each group will receive their instructions separately. First, I will give inventories to all the Form "A" students and then read them their instructions. Then I will do the same thing for the Form "B" students.

3. "Now, you Form "A" students, when I call your name come up and take your inventory back to your seat and wait for further instructions."

4. Distribute the inventories and then read Instructions A through E to students. After this say:

   "Ladies and Gentlemen, please get started and work carefully."

5. After the Form "A" students have begun, softly tell the Form "B" group (all those without inventories) to meet you in the back of the room. Then give them their inventories, read them their instructions, and send them back to their seats to get started.*

---

*During the entire administration of the inventory, avoid asking students if they have questions. If a student asks a question, try to politely sidestep it until after the inventories have been completed, unless it has to do with clarifying the inventory instructions. However, if a child doesn't know how to read a word, after they raise their hand, you are to read it to them. But, don't "interpret" an entire sentence for a child.

CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo

Education Department

THE BOWLING GREEN/PASO ROBLES LEARNING STYLE INQUIRY

THE INTERVIEW SCRIPT

(First Draft)

(*LSI* Items #'s 11, 23, 31, 33, 54, 59, 74, 83, 85)

I. *Things outside of school are more important to me than my school work.* (*LSI* #11)

a. What was your answer to #11? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, they say: "Think about it a bit more (student's name); why did you put 'True,' 'False,' or 'Uncertain' for #11?".)

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. What things outside of school are more important than your school work? (Only for students who answered "True.")

II. *I like others to outline how I should do my schoolwork.* (*LSI* #23)

a. What was your answer to #23? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say, "Think about it a bit more (student's name). Why did you put 'True,' 'False,' or 'Uncertain' for #23?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. Why do you like to have your school work outlined for you? (Only if answered "True").

e. When somebody outlines your work, what do they do for you?

f. In your classroom when you are given assignments for homework, math, art, or other subjects, do you (or would you) like to be able to choose from the type of assignment you will work on?

III. *I like to feel inside what I learn.* (*LSI* #31)

a. What was your answer to #31? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say: "Think about it a bit more (student's name). Why did you put 'True,' 'False,' or 'Uncertain' for #31?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. Can you give me an example of something you felt inside when you learned it?

IV. *If I have to learn something new, I like to learn about it by having it told to me.* (*LSI* #33)

a. What was your answer to #33? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say: "Think about it a bit more (student's name). Why did you put 'True,' 'False,' or 'Uncertain' for #33?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. If answered "True," then ask: "In your classroom when you are given assignments for homework, or in math or art, or other areas, do you like it when the teacher gives you some choices that you can choose from?".

V. *I like my teacher to check my school work.* (*LSI* #54)

a. What was your answer to #54? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say: "Think about it a bit more (student's name). Why did you put 'True,' 'False,' or 'Uncertain' for #54?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. If "True," why do you like to have your work checked by the teacher?

e. If "False," why don't you like your teacher to check your work? Did you ever have a teacher with whom you liked to have your work checked? (If yes, then ask: "What was the difference?".)

VI. *I cannot get interested in my school work.* (*LSI* #59)

a. What was your answer to #59? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say: "Think about it a bit more (student's name). Why did you put 'True,' 'False,' or 'Uncertain' for #59?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. If "True," why do you find it difficult to be interested in school work? And, were you able to get interested in your work last year, or the year before? (If "yes," then: "What was the difference?")

VII. *I like exact directions before I begin a task.* (*LSI* #74)

a. What was your answer to #74? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say: "Think about it a bit more (Student's Name). Why did you put 'True,' 'False,' or 'Uncertain' for #74?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. If "True," why do you like exact instructions before beginning a task?

e. If "False," why do you prefer not to have exact instructions before beginning a task?

VIII. *I like to be able to move and experience the motion and the feel of what I study.* (*LSI* #83)

a. What was your answer to #83? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say: "Think about it a bit more (student's name). Why did you put 'True,' 'False,' or 'Uncertain' for #83?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. If "True" or "False" can you give a specific example to explain why you like (or do not like) to "be able to move and experience the motion and the feel of what" you study?

IX. *I like to learn through real experiences.* (*LSI* #85)

a. What was your answer to #85? (Good!)

b. When you answered--"True," "False," or "Uncertain"--what were you thinking about? (If the student doesn't answer after fifteen seconds, then say: "Think about it a bit more (student's name). Why did you put 'True,' 'False,' or 'Uncertain' for #85?")

c. If you had answered this item last year in the third grade, or the year before, might you have answered it differently? (If student says "yes," then ask: "Why?".)

d. If "True" or "False," what kind of "real" learning experience have you had recently?

A P P E N D I X C

CATEGORY BY CATEGORY BREAKDOWNS

FOR SELECTED BOWLING GREEN STUDENTS

CATEGORY BY CATEGORY BREAKDOWN OF UNCERTAIN RESPONSES

STUDENT NAME: _____

SCHOOL: Concept

Category No.	1982 ("U"= 47) LSI Item Number	("U"= 42) Total Number Condition Red Category= 11	Total Number of Repeated Items= ___ Repeated Items
1	44, 88, 101	✓ (60%)	
2			
3	10, 36, 39	✓ (75%)	
4			
5			
6			
7	11, 30, 59, 91	✓ (66.6%)	
8	59, 76, 82		
9	42, 49, 82	✓ (75%)	
10	4, 23, 52	✓ (60%)	
11			
12	8, 94		
13	57, 77		
14	8, 20, 94	✓ (100%)	
15	27, 92	✓ (100%)	
16	21		
17	35, 60, 72, 89, 99	✓ (83%)	
18	31, 51, 55, 72, 83, 85, 99, 104	✓ (73%)	
19	22		
20	26, 62, 69, 79	✓ (50%)	
21	79		
22	62, 100		
23			
24	25, 58, 70, 95	✓ (100%)	

CATEGORY BY CATEGORY BREAKDOWN OF UNCERTAIN RESPONSES

STUDENT NAME: _____

SCHOOL: Conneaut

Category No.	1982 ("U"= 36) LSI Item Number	("U"= 19) Total Number Condition Red Category= 7	Total Number of Repeated Items= ___ Repeated Items
1	44		
2	3, 16, 65	✓ (75%)	
3	36, 39	✓ (50%)	
4	6, 7, 19	✓ (100%)	
5			
6			
7	11, 59		
8	59, 76		
9	49		
10	33		
11			
12	8		
13	57, 77, 87, 98	✓ (50%)	
14	8		
15	27	✓ (50%)	
16	21, 33, 61	✓ (60%)	
17	64, 72, 89	✓ (50%)	
18	31, 51, 72, 83, 85 (45%)		
19	18, 24 (40%)		
20	62, 79, 86		
21	79		
22	62, 96		
23			
24			

CATEGORY BY CATEGORY BREAKDOWN OF UNCERTAIN RESPONSES

STUDENT NAME: _____

SCHOOL: Conneaut

Category No.	1982 ("U"= 27) LSI Item Number	("U"= 15) Total Number Condition Red Category= 5	Total Number of Repeated Items= ___ Repeated Items
1			
2	3, 34	✓ (50%)	
3	10, 36, 39	✓ (75%)	
4	6		
5			
6			
7	30		
8	38, 47, 71, 76 (44%)		
9			
10	23, 33 (40%)		
11			
12	67		
13	77, 87		
14			
15			
16	33, 43, 61	✓ (60%)	
17			
18	83		
19	18, 22, 66, 93	✓ (80%)	
20	73		
21			
22	29, 96, 103	✓ (50%)	
23			
24			

CATEGORY BY CATEGORY BREAKDOWN OF UNCERTAIN RESPONSES

STUDENT NAME: _____

SCHOOL: Connecut

Category No.	1982 ("U"= 39) LSI Item Number	("U"= 36) Total Number Condition Red Category= 7	Total Number of Repeated Items= Repeated Items
1			
2	34		
3	10, 36, 39	✓ (75%)	
4			
5			
6			
7	40, 59		
8	59		
9			
10	4, 23, 52, 74	✓ (80%)	
11			
12	8, 94		
13	87, 98		
14	8, 94	✓ (66.6%)	
15			
16	21, 40, 61	✓ (60%)	
17	72, 99		
18	31, 40, 72, 83, 85, 99	✓ (55%)	
19	18, 22, 66, 93	✓ (80%)	
20	12, 26, 48, 62, 69, 73, 79, 86	✓ (100%)	
21	75, 79, 90	✓ (100%)	
22	62, 96, 100	✓ (50%)	
23			
24			

A P P E N D I X D

THE FORM "A" PROFILE AND CATEGORY-BY-CATEGORY BREAKDOWN

OF FORM "B" DATA FROM A GREEN STUDENT

WITH 43 UNCERTAINS, 10 "HIGH UNCERTAINTY" AREAS

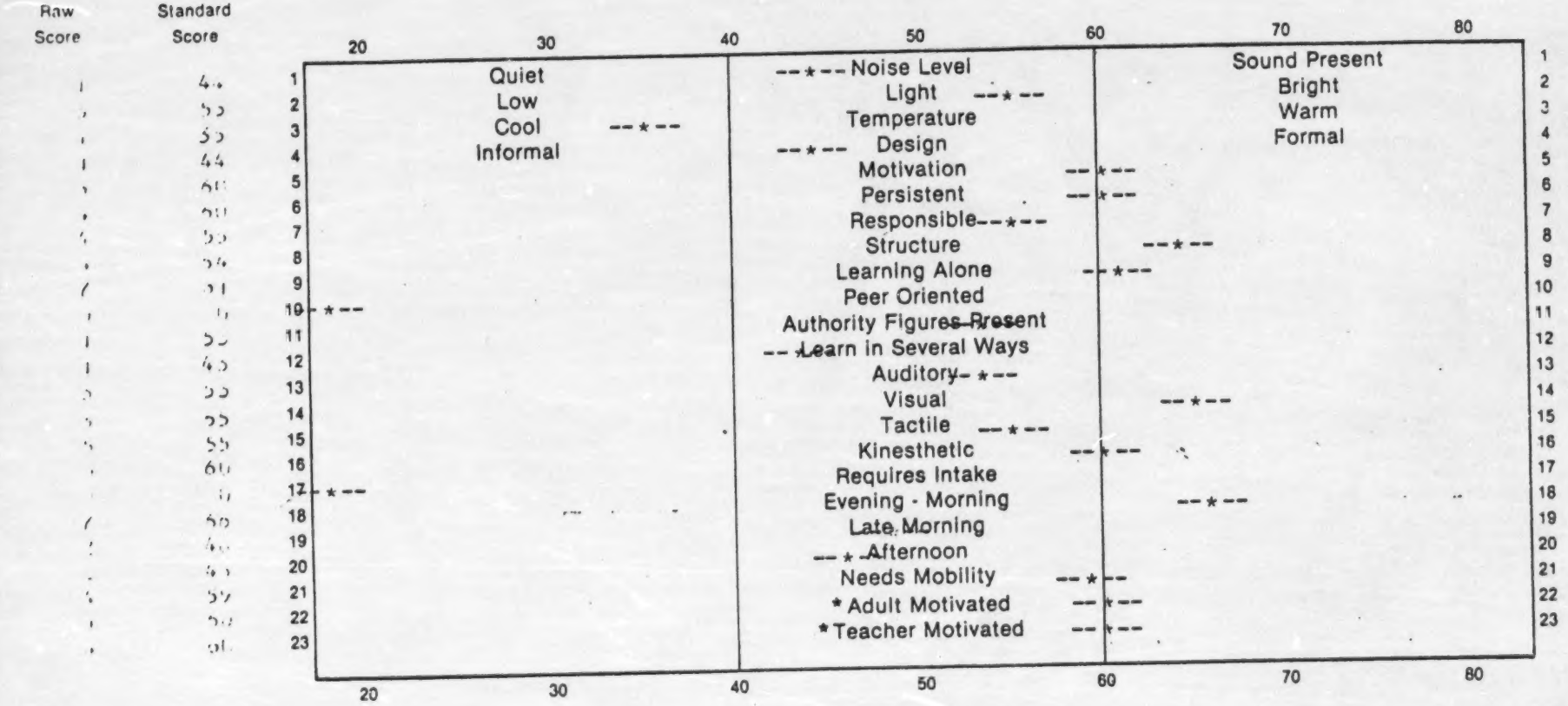
AND 5 "POTENTIALLY MISLEADING AREAS"

LEARNING STYLE INVENTORY

Name: Sex: Year in School: Date of Birth: / I.D. No.:
Yr./Mo.

Group Identification: PASO ROBLES CAL A Special Code: Date: 03-07-1983 Group No.:

PREFERENCE SUMMARY



40

42

PROFILE NO.:

Copyright 1982, Price Systems, Inc., P.O. Box 3067, Lawrence, KS 66044

* These scales are on LSI profile only.

43

CATEGORY BY CATEGORY BREAKDOWN OF UNCERTAIN RESPONSES

STUDENT NAME:_____

SCHOOL: Georgia Brown School

Category No.	May 1982 ("U"= 43) Total Number Condition Red Category=____	("U"= 10) Total Number Condition Red Category=____	Total Number of Repeated Items=___ Repeated Items
1			
2	3, 16	50%	
3	10		
4	6, 7	66%	
5			
6	97		
7	30, 40		
8	76		
9	42		
10	4, 23, 33, 52	80%	
11			
12	56, 67, 84, 94, 102	71%	
13	87		
14	94		
15	92	50%	
16	21, 33, 40, 61	80%	
17	64, 72, 89	50%	
18	40, 51, 72, 83, 85 40%		
19	18, 24, 66	60%	
20	12, 48, 62, 69, 73, 79, 86	85%	
21	75, 79	66%	
22	62, 100		
23			
24			

A P P E N D I X E

SELECTED LEARNING STYLE DEFINITIONS

SELECTED LEARNING STYLE DEFINITIONS

1. "LEARNING STYLES ARE COGNITIVE, AFFECTIVE, AND PHYSIOLOGICAL TRAITS THAT CHARACTERIZE HOW LEARNERS TYPICALLY LEARN BEST."

   JAMES KEEFE/NASSP DIRECTOR OF RESEARCH

2. "LEARNING STYLE IS THE MANNER IN WHICH AT LEAST EIGHTEEN DIFFERENT ELEMENTS FROM BASIC STIMULI AFFECT A PERSON'S ABILITY TO ABSORB AND RETAIN INFORMATION."

   THE DUNN/PRICE DEFINITION

3. FOR PURPOSES OF THIS INSTRUMENT, LEARNING STYLES ARE DEFINED AS ONE OR MORE OF THE FOLLOWING NINE INSTRUCTIONAL STRATEGIES MOST PREFERRED BY INDIVIDUAL STUDENTS AS THEY INTERACT WITH PARTICULAR BODIES OF CURRICULAR MATERIAL:

   A. PROJECTS
   B. DRILL & RECITATION
   C. PEER TEACHING
   D. DISCUSSION
   E. TEACHING GAMES
   F. INDEPENDENT STUDY
   G. PROGRAMMED INSTRUCTION
   H. LECTURE
   I. SIMULATION

   THE RENZULLI/SMITH DEFINITION

4. A STUDENT'S LEARNING STYLE IS A SPECIFICATION OF THOSE EDUCATIONAL CONDITIONS UNDER WHICH THE STUDENT IS MOST LIKELY TO LEARN.

   DAVID HUNT (MY PARAPHRASE)

5. COGNITIVE STYLE DIFFERENCES (FIELD INDEPENDENT/FIELD SENSITIVE) AND CULTURAL DIFFERENCES CREATE INDIVIDUAL LEARNING STYLES... WHICH ARE MODIFIABLE.

   RAMIREZ AND CASTAÑEDA

6. LEARNING STYLE IS A SPECIFIC ORIENTATION TO ONE OF FOUR BASIC LEARNING MODES: CONCRETE EXPERIENCE; REFLECTIVE OBSERVATION; ABSTRACT CONCEPTUALIZATION; AND ACTIVE EXPERIMENTATION.

   DAVID KOLB

A P P E N D I X F

A SELECTED LIST OF

LEARNING STYLE PROJECTS AND RESEARCH QUESTIONS

LIST OF LEARNING STYLE PROJECTS

AND RESEARCH QUESTIONS

I. Use the Learning Style Network's *Instrument Classification System* (1983) to identify instruments which appear to be appropriate for your district's consideration. Establish a committee to study these instruments to identify the ones which appear most suitable for your school or school district.

II. After you identify the instrument(s) and approaches to learning style data collection which you will utilize, have your committee conduct a content analysis of the selected inventory(ies) to see if it would be fruitful for the committee to develop a learning style questionnaire to illuminate selected aspects of the learning style inventory. For example, two instruments based on the Dunn and Dunn model of learning style, the Dunn/Price *Learning Style Inventory* and the Carbo *Reading Style Inventory*, contain items which, among other things, allow students to: (a) identify the time of day they like to learn or read; (b) indicate how sound and warmth interact with their reading and studying patterns, and (c) indicate whether they like to study or read by themselves (alone), with friends, and/or with the teacher or adults present. Analysis of the items which lead up to these conclusions may lead your committee to conclude that the "why" behind the student opinions expressed on the inventory are worthy of analysis. If this is true, the committee can leave the follow-up probing and analysis to each teacher, or they can formulate a set of questions which all students completing the inventory would answer. For example, the time of day in which students indicate that they prefer to study or read may often be a reflection of an internal biorhythm, but in some cases a strong time preference may be strongly influenced by sleeping habits, television viewing habits, morning eating habits, or may be a reflection of the particular way a student read the item. Questions such as the following may help to clarify the "why" behind the expressed student preference:

1) During the school week, Monday through Friday, what time during the evening do you usually go to bed (or fall asleep)?

☐ 7:00-8:00 P.M.	☐ 10:00 - 11:00 P.M.
☐ 8:00-9:00 P.M.	☐ 11:00 - 12:00 P.M.
☐ 9:00-10:00 P.M.	☐ After Midnight

2) Prior to coming to school, do you usually eat breakfast?

☐ Yes ☐ No

3) If you usually eat breakfast, describe the ingredients for two of your "typical" breakfasts.

A	B
_____	_____
_____	_____
_____	_____

4) During the week (Monday-Friday) during school months (September to June), on the average, how many hours of television do you view each day?

☐ One Hour or Less	☐ Four Hours or Less
☐ Two Hours or Less	☐ Five Hours or Less
☐ Three Hours or Less	☐ Six Hours or Less

5) For each day of the week, during the school year, indicate the latest evening hour in which you are watching television.

	Monday	Tuesday	Wednesday	Thursday	Sunday
7:00- 8:00 P.M.	☐	☐	☐	☐	☐
8:00- 9:00 P.M.	☐	☐	☐	☐	☐
9:00-10:00 P.M.	☐	☐	☐	☐	☐
10:00-11:00 P.M.	☐	☐	☐	☐	☐
11:00-12:00 P.M.	☐	☐	☐	☐	☐
After Midnight	☐	☐	☐	☐	☐

School districts which collect such questionnaire data along with inventory data could help determine, whether or not, significant numbers of students with strong afternnon and evening time preferences, as revealed by the inventories, have sleeping or eating patterns which may be contributing factors. And, whether or not the numbers involved were significant, data from questions such as those listed above, and others, might still prove interesting and useful to teachers. Furthermore, although we've used the Dunn/Price *Learning Style Inventory* and Marie Carbo's *Reading Style Inventory* as examples, we believe that most, if not all, of the data provided by inventories now available (first level data), would be enhanced by the type of second level questionnaire data we are suggesting.

III. If you or your committee choose to use the Dunn/Price *Learning Style Inventory* or the Marie Carbo *Reading Style Inventory*, inventories which identify weak, moderate, and strong modality preferences, consider the following inquiry. Select a random sample of those who are labelled "strong preference" auditory, visual, tactile, or kinesthetic students, and then administer the Barbe/Swassing Modality Index (BSMI) to see if there is a high correlation between inventory "strong preferences" and BSMI "modality strengths."

IV. If your committee chooses to use instruments which do not allow students to express uncertainty, consider the following inquiry. Select a random sample from the population which is completing the inventory, and then use the Chiarelott/Davidman Form A/Form B design to determine whether student uncertainty, for a selected instrument, is a factor worthy of consideration.

V. If you or your committee chooses an inventory which collects "sociological" data, that is, data which allows students to express a preference for studying or reading alone, or with peers, or with or without teachers or adults present, etc., we believe your committee should consider how teachers will identify whether these strong "sociological" preferences: (a) stem from healthy individual personalities; (b) are strongly influenced by cold, rapport-less teacher/student relationships; or (c) stem from individual shyness or reader anxiety. Further, we consider such "psychological" checking of strong "sociological" preferences to be challenging and sophisticated, and worthy of staff development by school district counselors.

In any event, if a certain number of students strongly report that they are not teacher or adult motivated, and do not like to learn with teachers or adults present, we feel the adults in question should inquire "How come?!" But, exactly how the adults should probe, in our opinion, is a question worthy of research.

VI. If your school district is large enough, (and there is someone around involved in a Ph.D. program) try to create an inquiry which would allow you to compare the relative influence of one type of learning style/teaching style data (or staff development program) with another. For example, the Renzulli/Smith *Learning Styles Inventory* and the Dunn/Price *Learning Style Inventory* define "learning style" differently, and provide teachers with different types of learning style data, as well as a form which provides teachers with insight into their own learning and/or teaching style. An inquiry which surveyed teacher's reactions to these instruments, as well as the relative influence of the two different types of data on student performance would be quite interesting, and would fill a gap.

VII. If the K-3 teachers and administrators in your school district are interested in learning style data collection and utilization, try to develop an implementation model in which Manuel Ramirez III's *Early Learning Behaviors Checklists* (utilizing the teacher observation approach and striving for learning style nurturance and expansion) can be compared with a self-report approach which utilizes student's strengths but does not systematically, through learning experiences, try to expand the student's repertoire of learning styles. Both the *Learning Style Inventory:* Primary Version (Perrin, 1981) and the *Reading Style Inventory* (Carbo, 1980), which are based on the Dunn/Price *Learning Style Inventory,* would serve well in such a comparison.

VIII. Another interesting task for a district-wide learning style committee would be to develop a list of learning style interventions which ranged from the relatively small and simple in terms of implementation, to the large and relatively complex. For example, at the small end of the scale, schools with staggered reading programs where some readers come in a half hour early (8:30-9:00 A.M.) and others stay a half hour later (3:00-3:30), should be able to more easily allow students with a strong preference for afternoon or morning reading to receive reading instruction, or engage in sustained silent reading, when they want to.